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Climate Change, Agriculture and Food Security

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The SmartAG Partner

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International Womens Day
March 8

Message From
The Program Leader

We are pleased to share with you our SmartAg Partner bi-annual newsletter, highlighting policy engagement and ongoing research from July to December 2017.

In July, we hosted an online discussion forum on 'Engaging African Youth in Agribusiness in a Changing Climate,' a platform that created space to discuss critical issues facing African youth. The online discussion—which attracted 79 comments—ran for one month to commemorate World Youth Skills Day (15 July) and International Youth Day (12 August) and culminated in a webinar attended by 80 participants on 30 August.

Climate services play a key role in supporting resilience of agricultural communities. In August, the Rwanda Climate Services for Agriculture project organized a four-day training of trainers on Participatory Integrated Climate Services for Agriculture (PICSA) in Huye district. This was followed by a field training, which allowed participants to work with smallholder farmers on the PICSA process. Additionally, to empower decision-makers on climate services, IGAD Climate Prediction & Applications Centre (ICPAC) organized a workshop on 'Existing and New Tools for Drought Monitoring and Forecasting in Eastern Africa'.

CCAFS East Africa has begun to explore digital agriculture and its potential to transform farming in the region. In October, during the Global Green Growth Week, we brought together stakeholders to discuss the opportunities and challenges of digital agriculture. As a result of the discussions held in Addis Ababa, Ethiopia, CCAFS East Africa is now leading the formation of a Public-Private Partnership project that is aimed at tackling the challenges related to agriculture data infrastructure.

In December, CCAFS scientists led a session on upscaling climate-smart agriculture through multi-stakeholder participation during the conference on "Research & Policy: two peas in a pod? A dialogue for food security impact" organized by the Netherlands Organisation for Scientific Research (NWO-WOTRO) and the Food and Business Knowledge Platform (F&BKP) in collaboration with the Dutch Ministries of Foreign Affairs and Agriculture, Nature and Food Quality. During the session, new projects on upscaling climate-smart agriculture approaches in Eastern and Southern Africa were presented that are expected to promote research-based advanced understanding of emerging key issues in global and regional food security, their impact on local food security, and the role of private sector development.

Dr. Dawit Solomon

1

Unpacking climate-smart agriculture for upscaling in East Africa

Despite its inception in 2010, climate-smart agriculture is yet to gain buy-in from stakeholders in Africa and beyond.

By Catherine Mungai, Maren Radeny and Dawit Solomon

On 1 December 2017, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) facilitated a session on "Upscaling CSA through multi-stakeholder participation" during the conference on "Research & Policy: two peas in a pod? A dialogue for food security impact" organized by the Netherlands Organisation for Scientific Research (NWO-WOTRO) and the Food and Business Knowledge Platform (F&BKP) in collaboration with the Dutch Ministries of Foreign Affairs and Agriculture, Nature and Food Quality. The conference brought together around 150 participants from the Netherlands, Africa and South Asia.

What is different about climate-smart agriculture?

During the session facilitated by CCAFS, it emerged that the climate-smart agriculture (CSA) concept still needs to be demystified and unpacked for stakeholders, including policymakers who are required to create an enabling environment to support uptake and upscaling of CSA technologies and practices. Climate change and variability will have a great impact on food security and nutrition and livelihoods in East Africa, and CSA offers unique opportunities to meet the multiple objectives of improving food and nutrition security, enhance adaptation to climate change and reduce greenhouse gas (GHG) emissions at local scales.

In his opening presentation, Dr. Dawit Solomon, CCAFS East Africa Program Leader, emphasized that CSA is different from other approaches as it has an explicit consideration of climatic risks that are happening more rapidly and with greater intensity than in the past. He also acknowledged that there are growing concerns that the term is being used to green-wash practices that are, in fact, damaging for the climate and for farming.

He pointed out that there are new investment opportunities for agriculture. By explicitly focusing on climate change, CSA opens up new financing opportunities for agricultural development, by allowing the sector to tap into climate finance for adaptation and mitigation.

Emerging opportunities to support upscaling of climate-smart agriculture

The recently concluded 23rd session of the Conference of the Parties (COP23) to the UN Convention on Climate Change (UNFCCC) held in Bonn marks a milestone for negotiations on agriculture. A key feature of the decision is that while so far negotiations have remained in the technical body of the UNFCCC (SBSTA), the COP has now asked SBSTA and the UNFCCC's implementation body (Subsidiary Body for Implementation – SBI) to jointly address issues related to agriculture through the Koronivia Joint Work on Agriculture. This will bring greater focus on implementing climate actions in agriculture as opposed to negotiations focused

J. Recha (CCAFS)

Climate-smart villages in Lemo, Ethiopia. Climate change and variability will have a great impact on food security and nutrition and livelihoods in East Africa, and CSA offers unique opportunities to tackle the climate challenges.

on scientific and technical aspects only. The momentous decision on agriculture at COP23 opens the door to bold and transformative action to make farmers' livelihoods and food supply more resilient.

During the 'world café' session facilitated by Sophia Huyer, Gender and Social Inclusion Research Leader at CCAFS, participants highlighted some of the opportunities and enabling factors that can support the upscaling of CSA in East Africa:

- Exploring the role of insurance in addressing climate risks amongst smallholder farmers;
- Integrating innovative financing mechanisms including blending climate finance into development planning;
- Identifying entry points for private sector investments;
- Undertaking education and awareness raising on CSA; and
- Building entrepreneurial and agri-business skills, especially among the youth.

New projects on upscaling climate-smart agriculture approaches in East Africa

With support from the Dutch government, through a collaboration between CCAFS and the Food and Business Global Challenges Program (GCP), new projects have been commissioned to promote scaling up of CSA in East Africa beginning 2018. During the session, the different GCP projects were presented and include:

- Citizen's Science approach to climate-smart and nutrition sensitive seed value chains for food and nutrition security in Uganda and Ethiopia - Silvia Sarapura of the Royal Tropical Institute;
- Upscaling CSA with small-scale food producers organised via Village Savings and Loan Associations (VSLAs): Financing for adoption, behavioural change and resilience in rural Iringa Region, Tanzania - Ruerd Ruben of Wageningen University and Research;
- Inclusive and climate-smart business models in Ethiopian and Kenyan dairy value chains - Rik Eweg of Van Hall Larenstein, University of Applied Sciences University;
- Understanding and improving scaling readiness of climate-smart, nutrient management decision support tools (DST) in different institutional environments: Ethiopia & Tanzania - Cees Leeuwis of Wageningen University and Research;
- Understanding and scaling Organizations for SMAllholder Resilience - Domenico Dentoni of Wageningen University and Research;
- Using climate-smart Financial Diaries for Scaling in the Nyando Basin, Kenya - Lia van Wesenbeeck of The Vrije Universiteit Amsterdam;
- Promoting climate resilient seed varieties: Smallholder barriers to adoption and willingness to pay for seed of drought tolerant maize varieties in Uganda - Astrid Mastenbroek of Wageningen University and Research.

Next steps

Policymakers need to meet their obligations under the Paris Agreement including the Nationally Determined Contributions (NDCs), and CSA is an approach that can be used to achieve this. However, policies tend to be generic and long lasting while research is very specific. Therefore, there is a need for policymakers and researchers to work together. The new GCP projects and the ongoing CCAFS initiatives in the Climate-Smart Villages in East Africa will create conducive learning grounds for researchers, policymakers and other stakeholders to collaborate with farming communities and other players along the agricultural value chain to identify how CSA can be upscaled in East Africa.

The GCP projects will be officially launched on 6-7 February 2018, in Arusha, Tanzania. The projects are expected to achieve impact on the objective of the Global Challenges Programme (GCP) which is to promote research-based advanced understanding of emerging key issues in global and regional food security and their impact on local food security, and the role of private sector development. The kick-off meeting is the start of a collaboration between CCAFS, NWO-WOTRO and F&BKP. A key focus of this collaboration is on impact, and how to realize the involvement of target groups and the back flowing of results into society, in particular policy and practice.

Read more:

Video: Research & policy: two peas in a pod? Interview with Dawit Solomon: http://bit.ly/2o93YbG
Conference concept note: Theme 7 – Climate Smart Agriculture in East Africa: http://bit.ly/2HWPG76
Background paper: Climate-smart agriculture (CSA) for resilient agriculture, food security and inclusive business growth in East Africa: http://bit.ly/2FNegqA

Catherine Mungai is the Partnership and Policy specialist (CCAFS EA), Maren Radeny is the Science Officer (CCAFS EA) and Dawit Solomon is the Regional Program Leader (CCAFS EA).

2

Is agribusiness the magic bullet for youth unemployment in Africa?

Africa is facing a double employment crisis—a lack of jobs for youth, and an increasing number of young people in need of work. While agriculture is the largest sector of employment in Africa with promising job opportunities for youth, the sector is often regarded as unattractive for and by young people.

By Lili Szilagyi and Catherine Mungai

Africa has the largest population of young people in the world, with 226 million people aged between 15 to 24 years. Every year, young graduates from schools and colleges seek to enter the continent's workforce, often with no success. What role can the agriculture play in addressing the unemployment challenge in Africa? According to a World Bank report on "Growing Africa: Unlocking the Potential of Agribusiness", Africa's farmers and agribusinesses could create a trillion-dollar food market by 2030 if they can expand their access to more capital, electricity, better technology and irrigated land to grow high-value nutritious foods. National governments, however, need to work side-by-side with agribusinesses, to link farmers with consumers in an increasingly urbanized Africa.

To stimulate discussions on developing a framework for concrete youth engagement in agribusiness in a changing climate, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), the CGIAR Research Program on Livestock, the Climate Smart Agriculture Youth Network (CSAYN), AgriProFocus and ICCO Cooperation put together an online discussion and a webinar. The online discussion —which attracted 79 comments —ran for one month to commemorate World Youth Skills Day (15 July) and International Youth Day (12 August) and culminated in a webinar attended by 80 participants (30 August). A key message from the online discussion and the webinar is the need to address the negative perception towards agriculture.

> "I gladly applied to study agricultural economics in the university but was surprised that 90% of my classmates then, did not have interest in the course. In fact, most of them left the course before our graduation while few struggled to finish. Based on the question asked, agriculture is not a preferred career or choice course for young people because of wrong mindset and poor orientation of youth and parents about agriculture. Sincerely, my parents did not want me to study agriculture because there are uncountable number of farmers that died poor and they don't want me to be among the number." Fakunle, online discussion.

Youth engagement in climate-smart agriculture

Divine Ntiokam from CSAYN set the scene for the discussion by sharing CSAYN's work on youth engagement in Africa. The group, run on a voluntary basis, promotes and strengthens climate-smart agriculture among youth. More specifically, CSAYN aims to raise awareness of the contributions youth can make in agriculture for a better future, especially through climate-smart practices.

CSAYN does outstanding work in this area. In Rwanda, for

G.Smith (CIAT)

Africa has the largest population of young people in the world and agriculture can play a huge role in creating employment for this massive population.

example, CSAYN partnered with SOS Children's Village in February 2017, to train over 50 young students on how to protect the environment, particularly sensitization on the impact of climate change on agricultural productivity. In Mali, CSAYN organized environmental academies such as climate justice ambassadors to raise awareness about climate change and created CSAYN Mali club, and planted 25 trees with children in two schools.

Agriculture offers many opportunities along the value chain. Victor Esendi from AgriProFocus emphasized that we need to think of new ways to create new opportunities or expand existing ones for youth employment in agriculture.

"We see climate-smart agriculture as an opportunity for African youth to innovate and ensure continuous supply."

While climate change affects food production, young people can think of new technologies to produce or preserve food, and ensure supply to the market.

The opportunities are there, but how can we actually engage youth?

Wouter Kleijn from the International Livestock Research Institute (ILRI) addressed how policies and programmes can facilitate youth involvement in agribusinesses focusing on three questions:

Should we engage more youth? There are legitimate arguments expressed against focusing on youth involvement; for example, that by increasing production on big farms can address food security without demand for more labor, or that population growth will offset all the youth moving away from rural areas. But even if young people will stay in rural areas, it does not mean they will be involved in agriculture, Mr. Kleijn said and added that "there is an issue of too many youths with too few jobs in urban areas and this eventually will lead, if we are not careful, to violence".

What is different between youth today from youth of previous generations? Climate change makes agriculture more knowledge-intensive and more difficult, and even less attractive for youth. There is also less land available because of population growth and increased life expectancy. Youth are also more aware of alternatives; "they see on their mobile phones, they see it on the television that there are other lives out there, other possibilities".

Knowing all of this, how can we involve youth? There is no blueprint solution but there are a few things to explore. For example, addressing the 'usual suspects' such as infrastructure, corruption, education supporting existing youth entrepreneurs and encouraging them to scale up so they might employ other youth.

There is need for practical examples and more youth engagement. Catherine Mungai from CCAFS East Africa shared why it is important to engage with the youth in terms of research and policy-making. She gave example of CCAFS East Africa's work with the youth in the Nyando Climate-Smart Villages (CSVs), where youth are testing a couple of CSA practices and technologies. "There are a lot of opportunities to involve youth, such as in agroforestry, irrigation, fish farming, and in developing apps for climate information services, we need to find a way to present agriculture as an interesting opportunity for youth."

Way forward

During wrap up session of the webinar led by Alpha Gitau from ICCO Cooperation, participants emphasized that change does not happen overnight, we need to focus on youth who are already interested in agriculture. We need to start small and grow youth-led agribusinesses slowly, helping them get access to resources and encouraging them to innovate. We also need to support already-existing networks such as CSAYN and YPARD who are already addressing young people so that they can speak with one voice for those who support youth engagement in agribusiness, including CCAFS.

Read more:

Visit the online discussion forum on engaging African youth in agribusiness in a changing climate: http://bit.ly/2tdi3Fu
Who calls the shots? Youth participation in agricultural decisions and national policy: http://bit.ly/2BkLDkG
From food to money in the pocket: Engaging African youth in climate-smart agriculture: http://bit.ly/2nY3EzQ
Youth involvement in agribusiness: Examples from Africa: http://bit.ly/2C1Cdaj

Lili Szilagyi is the Communications consultant for the CCAFS Program Management Unit and CCAFS East Africa.
Catherine Mungai is the Partnerships and policy specialist at CCAFS East Africa.

3

Developing user-centric climate services to enhance drought resilience in Africa

Climate services play a key role in supporting the resilience of communities but continue to be inaccessible to large numbers of climate-vulnerable people.

By Catherine Mungai

***"A portfolio of user co-designed and co-developed online climate information 'Maprooms' will help decision makers better manage drought risk in three priority areas in East Africa: disaster risk reduction, agriculture and food security, and public health." This was the key conclusion from the workshop on 'Existing and New Tools for Drought Monitoring and Forecasting in Eastern Africa'* hosted by the IGAD Climate Prediction & Applications Centre (ICPAC).**

From 23 to 25 August, 70 participants from national meteorological services, international partners, as well as expert practitioners, policymakers, and researchers from agriculture, health, disaster risk reduction, water resource management, education and finance reviewed current tools for climate services and offered recommendations for new climate tools for drought risk management in Eastern Africa. The workshop, which took place immediately after the Forty Seventh Greater Horn of Africa Climate Outlook Forum (GHACOF47), was designed to address two main objectives: (i) make decision-makers in target sectors more aware of the online climate information that is available or under development; (ii) and give these decision-makers a voice in the information that national meteorological services provide in the near future.

The climate change challenge – the perfect storm

"Drought is a slow creeping hazard; how can we predict then prepare for this? We acknowledge that tools and information are available; however, the challenge is awareness among users and also skills on how to use the tools," stated Dr. Ladislaus Chang'a of the Tanzania Meteorological Agency.

This was also emphasized by Dr. Guleid Artan, the director of ICPAC, who pointed out that over 27 million people in the region have been affected by drought over the last 4 years.

Even though episodic droughts have always been present in East Africa, studies show they have become more frequent in recent decades. There is growing evidence suggesting that the impacts of current and recent droughts in East Africa are likely to have been aggravated by climate change. Poverty, chronic malnutrition, weak governance, conflict, drought and climate change have combined to create a perfect storm.

During the panel session on 'policy and operational needs for drought-related disasters,' panellists from agriculture, livestock, health and disaster risk management sectors agreed that pastoralists and smallholder farmers are most at risk. They lack the skills and resources to cope with the inherent risks of farming, live on harsher lands, and rarely have access to economic safety nets when crops fail and livestock die.

K. Trautmann

There is an increasing demand for tailored climate information products and services to enhance the resilience of farming communities in Africa.

More frequent droughts are making it harder for people to recover between shocks, making them more vulnerable. As such, there is an increasing need and demand for tailored climate information products and services for agriculture and food security, pastoral systems, health, water, and energy resources in Eastern Africa."We see climate-smart agriculture as an opportunity for African youth to innovate and ensure continuous supply."

Tools for developing sector specific responses

To respond to the challenges caused by climate change, research institutions have partnered with regional and national meteorological service providers to create online "Maproom" tools that can be used to inform decision making across sectors. During the workshop, the following Maprooms were shown:

- ICPAC drought risk analysis, monitoring and prediction Maprooms;
- ENACTS Climate Data and Maprooms available from several National Meteorological and Hydrological Services (NMHS);
- WISER-SCIPEA Climate Data Portal at ICPAC, which provides NMHS access to seasonal forecast model output from several international forecasting centers;
- Meteo-Rwanda Agriculture and Food Security Maprooms, under development through the CCAFS-led Rwanda Climate Services for Agriculture project.

This was followed by practical session where participants had the opportunity to use the different tools and give recommendations on improving their usefulness for sector-specific drought management needs.

Participants recognized that climate information tools need to be accompanied by climate-smart response strategies that are sector specific, but also enhance integration across sectors where possible. "One Health"—an approach which seeks to address challenges that threaten human and animal health, food security and poverty and the environments where diseases flourish—is one such integrative approach, presented by Madeleine Thomson, a senior research scientist at the International Research Institute for Climate and Society (IRI).

The future outlook

The workshop showcased a rapidly expanding suite of online climate information tools. New Maproom tools for agricultural and food security decision-makers, some still prototypes or under development, are being rolled out at a national scale in Rwanda, and regionally through ICPAC. CCAFS and IRI are working with ICPAC to increase its ability to assist the NMHS of member countries in East Africa to provide online Maprooms that better serve the needs of their farming populations and agricultural sector. Workshop participants offered several additional recommendations for increasing the use of climate information for managing drought risk:

- Expand sector- specific Maprooms beyond agriculture and health, to include disaster, water, energy and tourism;
- Integrate sectorial and socio-economic data with climate databases, to better inform decision-making;
- Promote sustainability by involving users with national meteorological services in the co-development of tools.
- Enhance access through mobile phone applications, and offline access versions where Internet connectivity is unavailable;
- Encourage continued collaboration across sectors; and among research institutions, line ministries, private sector, and development and humanitarian organizations working directly with communities.

The workshop was organized jointly by ICPAC, CSRD, IRI, CCAFS and UK Met Office; and hosted by the Tanzania Meteorological Agency.

Financial and in-kind support for the workshop came from the U.S. Agency for International Development (USAID), through the Climate Services for Resilient Development (CSRD) Partnership, the Climate Services for Africa project, and the Rwanda Climate Services for Africa project, and from the UK Department for International Development (DfID), through the WISER (Weather and Climate Information Services for Africa)-ENACTS and WISER- SCIPEA (Strengthening Climate Information Partnerships - East Africa) projects.

Read more:

Press release: IGAD Sectorial Users to Assess Tools for Drought Risk Management http://bit.ly/2Ayaguk
Blog: Partnering with national meteorological services to support farmers in Africa http://bit.ly/2BfU1ls
Blog: Local beats global when it comes to national climate services in Rwanda http://bit.ly/2AxmPpS

Catherine Mungai is the Partnerships and policy specialist for CCAFS East Africa.

4

CCAFS showcases its Maproom project at the University of Rwanda Scientific Conference Week 2017

It is now feasible to provide climate information services that are actionable at the local scale of agricultural decision-making.

By Tabitha Muchaba

The impact of climate change on Rwanda's agriculture and sustainable development is a continuous challenge. The growing concern has yielded much research on agricultural transformation from subsistence agriculture to intensive, market-oriented agriculture. This was one of the recurring themes of the Scientific Conference Week that was held from 14-16 June 2017 in Kigali, Rwanda. The conference was organized by the University of Rwanda in partnership with UR Sweden Program, Rwanda Development Board and the International Institute of Tropical Agriculture (IITA). Under the overall theme 'Rebranding Research for Sustainable Development' the two-day conference brought together various stakeholders from academia and industry to share their knowledge, innovation and expertise.

The conference created a platform to showcase how the Enhancing National Climate Services initiative (ENACTS) implemented by the International Research Institute for Climate and Society (IRI) has filled the 15-year gap in Rwanda's historical meteorological records. Through ENACTS, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) works with International Center for Tropical Agriculture (CIAT) and other partners to support Rwanda's National Meteorological Services (NMS) to fill data gaps and to provide high quality climate information. As a result, it is now feasible to provide climate information services that are actionable at the local scale of agricultural decision-making. The ENACTS approach overcomes data gaps by blending NMS station data with satellite and other proxy data, to produce moderately high-resolution (roughly 4 km grid) historical gridded data (more than 30 years for rainfall, 50 years for temperature) and access to information is improved through the development of online "Maproom" tools derived from the historic data sets, integrated into the NMS web pages.

The Maproom is a collection of maps and other figures that are used to monitor past and present climate and societal conditions. The maps and figures can be manipulated and linked to the original data and users can choose which datasets are particularly useful for monitoring current conditions.

The Maproom also features a Climate Data Library - an online data repository and analysis tool that allows user's to view, analyze, and download hundreds of terabytes of climate-related data. The user can also monitor present climate conditions with maps and analyses and also create visual representations of data, including animations. This data can then be downloaded in a variety of commonly used formats including GIS-compatible formats. All this can be done by the user through a standard web browser for free.

The booth was visited by participants from academia and industry from more than 19 countries, keen to learn

A. Nyandwi/MINAGRI Rwanda

Farmers from Kayonza District, Rwanda review the training materials on climate forecast during a field visit as part of the Building Climate Services Capacity in Rwanda project.

more about the maproom and the climate data library.

This initiative is part of the USAID funded Rwanda Climate Services for Agriculture project. For more information regarding the project contact Desire Kagabo, the CCAFS Rwanda Climate Services for Agriculture Project Coordinator based at the International Center for Tropical Agriculture (CIAT), Kigali, Rwanda d.kagabo@cgiar.org

Read more:

Project factsheet: Rwanda Climate Services for Agriculture: http://bit.ly/2msT1PC
Blog: PICSA training of trainers: strengthening national and local capacity for climate services for agriculture in Rwanda: http://bit.ly/2iS8mcS

Tabitha Muchaba works for CCAFS East Africa.

5

Capacity building is a prerequisite to advocacy: An experience from Tanzania

A high-level event on gender responsiveness in policymaking and implementation goes back to basics.

By Edidah Ampaire, Perez Muchunguzi and Fazal Issa

On 13 September 2017, researchers from the International Institute of Tropical Agriculture (IITA), in partnership with the Tanzanian Ministry of Agriculture, Livestock and Fisheries (MALF) and Tanzania Civil Society Forum on Climate Change (FORUMCC), had the privilege of presenting findings of a recent study on gender integration in agriculture and natural resource policies to Members of Parliament (MPs). A key lesson was learnt during the process: gender is still a controversial topic for policymakers in the country.

Indeed, mixed emotions followed the presentation that articulated the findings on gender integration and gender budgets in Tanzania's natural resource, agriculture and climate change policies, strategies, and implementation plans.

The opposition shadow minister for agriculture, who is also a lecturer at the University of Dar es Salaam, stood up and cleared the air amidst an emotionally heated debate that followed the presentation of the findings of the study, saying:

> "What I see is a scientific study that clearly shows the findings about our national policies. It shows what we have done well and the gaps that need to be filled. What we need to do is develop and implement strategies to close the highlighted gaps, and I think [that] is clear."

The first part of the discussion was a divide in perceptions between the men that spoke first, querying the relevance and necessity of gender responsiveness, and women who then voiced support for the need to address gender issues in climate change adaptation, agriculture, and policy, and the benefits it can bring. The mixed reactions in the house as MPs spoke, one after the other, were a clear sign that there was less knowledge about gender than we, as researchers, had anticipated during the preparation and as we presented the findings. Indeed, previous CCAFS studies (on policies and gender budgeting and on gender considerations in agriculture and natural resource management policies) had already pointed out the need for creating gender awareness among policymakers in the country.

The male honourables took the floor first, three in a row, and expressed their disappointment with what, in their opinion, was less smart research and an irrelevant presentation. A few excerpts illustrate the atmosphere in the room:

> "Gender and climate mitigation are not related. We expected you to address the issue of climate change and not just gender. You would have done better to tell us the causes of climate change and what you have done about it", the first speaker emphasized, his disappointment evident in his voice.

P. Muchunguzi (IITA)

Mr. Fazal Issa of FORUMCC presents during the event for Tanzania Members of Parliament on gender and climate change adaptation.

"First, how do you expect government to prioritize investing money in gender and not infrastructure? Secondly, technical personnel that make our policies have expertize and cannot make a mistake of equating gender to women as your findings suggest."

"How did you select the sample for this study? For example, Njombe and Lushoto are not affected by climate change because they still receive enough rainfall, drought is not an issue in those places."

The debate became heated and diverted from the focus of the study. The opposition shadow minister for agriculture brought the house to order and pleaded with the MPs in attendance to focus on the findings of the study. Referring to the policy briefs that had been distributed, she explained that this was valid research, conducted on Tanzania policies that are named and known to them. She presented an analysis of her own that showed the number of policies that provided for gender well, those that did not, and those that did not provide a budget even when they had integrated gender. She emphasized that the discussion was not about agreeing with the findings or rejecting them but what they needed to do was think of strategies that can rectify the situation.

She was followed by the woman representative for Geita region, who spiced up the discussion further by giving practical examples from the field:

"I come from Geita, and this what I see: there is food shortage during the drought and men migrate to townships for up to eight months. Women shoulder the responsibility of feeding their families, including looking for fuel wood or charcoal and water. Under such circumstances, women should not only be sensitized about climate change and environment but should be supported [to] improve the livelihoods of their families… Even in southern Tanzania, men own land and cashew trees but women do all the work on the farm. Men show up at selling and demand the cash that has been earned…Gender matters in every way, and we should be working to correct mistakes in our policies."

Towards a harmonized understanding that gender matters

The discussions that followed suggested that participants were slowly appreciating that gender mattered and should be considered in policymaking. Again, most inputs were from male MPs. One male MP followed up on the discussions:

P. Muchunguzi (IITA)

The shadow minister for agriculture guiding the house to refocus on the study findings.

"In that case, this presentation should have highlighted how each gender group has been adapting to climate change and what the constraints are."

Another male MP from Lushoto explained that contrary to what earlier speakers had said, Lushoto had changed a great deal, and people there are experiencing impacts of climate change. He cited examples that included erratic rainfall patterns, lowering water tables, increased temperatures, and extreme weather events.

Another male MP questioned why districts were not effectively implementing the 10% commitment of their own budget source to gender (5% to youth and 5% to women) and suggested that they needed to put in place enforcement mechanisms to ensure this is done. However, as the study findings indicated, although realizing district commitment would be a good start, the amount is so small that it might not cause significant change.

The discussions were followed up by clarifications from MALF and FORUMCC representatives. FORUMCC is a civil society platform convened to stimulate cross-sector dialogue regarding climate change. Effort was invested in clarifying and emphasizing the relevance of gender in climate adaptation and food security, clarifying what climate change is (and is not), and giving examples of climate change impacts experienced in different areas of the country, especially those districts listed by MPs as examples.

Way forward

Through the committee chair, members of Parliament requested the partners (MALF, IITA and FORUMCC) to organize a capacity building session for them in the next parliamentary session in November 2017. MPs requested training on climate change, food security, gender, and environment and how these topics are interrelated.

FORUMCC will follow through the parliamentary protocols and arrange a training that will be implemented jointly with MALF.

The event, processes and actors

This policy engagement event took place on 13 September 2017. It was attended by a total of 35 members of the Tanzania Parliament and nine non-parliamentarians. MPs included members of the standing committee on agriculture, the environmental committee, the budget committee, the constitution, legal and governance committee, and representatives from the parliamentary youth and women groups.

The engagement started earlier in the day with the research team going to the parliamentary cafeteria and talking to some Members of Parliament as they took a break, both to lobby and follow up with key members to attend the meeting as well as briefing them on what the meeting was about. Although the effort paid off in terms of attendance, it is important that contact is maintained until Members of Parliament commit on some actions to change the situation – and this is the beauty of local partnerships that are most suited to do this follow up.

Read more:

Findings from the policy and budget analyses that were presented to the MPs are available in the following presentation: http://bit.ly/2Ccns5B

Edidah Ampaire is Project Leader for the Policy Action for Climate Change Adaptation (PACCA) project led by IITA; Perez Muchunguzi is a Multistakeholder Specialist at IITA, and Fazal Issa is Programme Officer at FORUMCC.

6

Rwanda establishes a national framework for climate services

How to effectively develop and apply climate services in support of agriculture and food security.

By Tabitha Muchaba, Yvonne Uwase and Gloriose Nsengiyumva

***"Climate services bridges the gap between weather and climate information to meet the users' requirements,"* said Hon. Dr. Vincent Biruta, Minister of Environment during the official opening of the National Consultative Workshop for Setting Up a National Framework for Climate Services (NFCS) in Rwanda.**

The NFCS, which is part of the Global Framework for Climate Services (GFCS) implementation plan and requirement, is a national coordinating mechanism for facilitating the development and delivery of climate services, to better manage climate risks at all levels, through development and incorporation of science-based climate information and prediction services into planning, policy and practice. The workshop, which was the first step towards NFCS, brought together experts and stakeholders from various agencies and institutions, with a goal to improve and sustain the flow, co-production and delivery of user-salient climate information. The Rwanda NFCS will be led by the Rwanda Meteorology Agency (Meteo Rwanda), a government agency under the Rwanda Ministry of Environment (MINIREMA), which already has established link and coordination among stakeholders of the existing initiatives on climate services provision in Rwanda, and will develop new governance structure to fully meet the end users' requirement.

Rwandan farmers have pointed out before that accessibility to relevant information on climate change will help them manage climate risks for better agricultural production. NFCS plans to set out a roadmap for an effective development and application of climate services in support of agriculture and food security and other key climate-sensitive sectors in Rwanda. It proposes recommendations for an elaborative National Action Plan, prioritizing climate risk management actions that can be taken by decision-makers, different sectors' stakeholders in response to plausible climate predictions.

With NFCS, Meteo Rwanda shall position itself to fully contribute to the planning and decision-making processes for the government of Rwanda with a view to attaining Sustainable Development Goals (SDGs), the Rwanda National Strategy for Transformation (NST), and the Rwanda Green Growth and Climate Resilience Strategy.

NFCS Implementation Plan

The implementation will be anchored on the following pillars:

- **User Interface Platform:** a structured means for users, climate researchers, and climate information providers to interact at all levels;
- **Climate Services Information System:** the mechanism through which information about climate (past, present, and future) will be routinely collected, stored and processed to generate products and services that inform often complex decision-making across a wide range of climate-sensitive activities and enterprises;
- **Observations and Monitoring:** to ensure that climate observations and other data necessary to meet the needs of end users are collected, managed and disseminated and are supported by relevant metadata;

A. Eitzinger (CIAT)

Rwanda Minister of Environment, Hon. Dr. Vincent Biruta and Rwanda Climate Services Project Coordinator, Dr. Desire Kagabo at the workshop exhibition area.

- **Research, Modelling, and Prediction:** to foster research towards continually improving the scientific quality of climate information, providing an evidence base for the impacts of climate change and variability and for the cost-effectiveness of using climate information;

Building climate services capacity in Rwanda

Joint efforts and strategies are being used to ensure that climate services information is downscaled and relevant to smallholder farmers in Rwanda. Meteo Rwanda has been working with the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) through the Rwanda Climate Services for Agriculture project funded by the United States Agency for International Development (USAID) to increase its capacity to provide climate information services as well as develop tools tailored to farmers' needs.

The project builds on the Enhancing National Climate Services (ENACTS) approach, by focusing on the creation of reliable climate information suitable for national and local decision-making. Under this initiative, Meteo Rwanda has merged satellite data with its observations to fill gaps in both space and time and can now provide a range of high-resolution climate information products tailored to agricultural user needs through web-based 'maprooms'. The Maprooms provide an efficient way to access location-specific data and graphs.

The workshop was held between 5 and 6 December 2017 in Nyamata, Busegera District in Rwanda, and brought together partners and experts from agriculture and food security, disaster management, transport safety (air, land and water), health, water resources management, environment, tourism and wildlife management, academic research, project management, leisure sport and public events sectors. The overall budget and funds mobilization for the implementation of the NFCS will be established after the development of the National Action Plan, which will specify projects to be undertaken. The workshop was organized by Meteo Rwanda and sponsored by USAID, WMO/GFCS, CIAT/CCAFS, International Research Institute for Climate and Society, University of Reading, and other partners.

Read more:

CCAFS: Best of 2017: http://bit.ly/2ELfhRz
Workshop Report: Training on IRI Climate Data Tools and developing a method for integrating climate data in Kigali, Rwanda: http://bit.ly/2EwkJsd
Blog: Collecting farmers' feedback on climate information services in Rwanda: http://bit.ly/2o9awbl
Blog: CCAFS Showcases its Maproom project at the University of Rwanda Scientific Conference Week 2017: http://bit.ly/2CpuKSp

Tabitha Muchaba works for CCAFS East Africa hosted by International Livestock Research Institute (ILRI).

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7

Building the capacity of farmers in small ruminant management for climate change adaptation and mitigation

Training on record keeping, objective measures for animal selection and controlled mating helps farmers manage improved breeds and thereby increase food security.

By Philip Kimeli, John Recha, James Audho and Edwin Oyieng

"Compared to local breeds, the crosses of the Red Maasai sheep and Galla goat are better able to withstand heat stress and to recover from drought, utilize poor forage and cope with diseases, and are able to attain mature market weights within shorter periods of time. The Red Maasai sheep have longer and large tails, which we prefer for our cultural ceremonies." Joshua Omollo, champion farmer.

Smallholder farmers in Nyando Climate-Smart Villages (CSVs) in western Kenya are testing a portfolio of agricultural interventions that respond to climate-related risks they face. One such intervention is the introduction of improved breeds of indigenous sheep and goats (collectively called small ruminants) in a bid to improve the productivity of the local Small East African sheep and goats. The small ruminants are important in ensuring food security under a changing climate as they provide households with both nutrition and disposable income. Their small body size, flexible feeding habits and short generation intervals make them suited to climate risk management. Their low investment costs are affordable to the subsistence farmers, and are often owned and tended by women and children. The improved breeds of Red Maasai sheep and Galla goats are crossed with the local breeds for resilience.

In order to build the capacity of farmers for improved small ruminant breeding and management, the International Livestock Research Institute (ILRI) undertakes regular, demand driven training. One such training event took place from 27 to 29 September, 2017. The training focused on improved small ruminant management practices and brought together over 250 champion farmers from seven villages. These champion farmers, were from the three umbrella Community-Based Organizations – FOKODEP, KAPSOKALE and NECODEP. The training covered record keeping, objective measures for animal selection and controlled mating.

Record keeping: Farmers were informed that this is useful in decision-making, keeping track of activities, production monitoring and documenting important events on the farm. The farmers were trained on the importance of weight records (birth weights, weaning weights and 9 months weight), animal health records, breeding records and pedigree records. The records are important for purposes of evaluating the economic benefit of the herd and to aid in selective breeding of the animals.

Objective measures for animal selection: In order to avoid subjective selection of animals for breeding, the farmers were taught the various objective measures for selecting animals. The farmers were taught how to estimate the age of sheep or goat using its dentition. The use of the chest girth and body length measurements to estimate the weight of sheep or goat was also demonstrated. Farmers were also taught how to select rams and bucks for breeding based on the observable characteristics of each animal resulting from the interaction of its genes with the environment. It was noted that the size

S. Kilungu (CCAFS)

Small ruminant management is part of a portfolio of climate-smart agriculture interventions farmers are testing in Nyando Climate-Smart Villages in Kenya.

and age of sheep and goats directly affects their productivity.

Controlled mating: The farmers were taken through an exercise of mapping the expected rainfall, lambing and kidding, and market demand across the twelve months of the year. Farmers were taught how to plan their mating depending on the seasons. It was emphasized that mating should be planned such that the animals give birth during the rainy season when there is enough pasture for the mothers to produce milk. This will ultimately promote good growth and survival rates. Farmers were taught how to use an apron that covers the male reproductive organs to prevent unwanted mating. The farmers were also urged to cull and/or sell the old rams or less productive animals instead of young potentially productive animals.

"In-breeding within the local Small East African sheep and goats in the Nyando area has resulted in more smaller animals that take long to mature and fetch poor market prices. The ILRI initiative has helped control in-breeding in the region, and the cross breeds are about one-third of the small ruminants in the villages," said Monica Bett, a Livestock extension officer from Kericho County Department of Agriculture, Livestock and Fisheries.

Upscaling of the small ruminant intervention is being planned through partnership with the private sector, and County Departments of Agriculture and Livestock. The households own an average of five sheep and six goats, out of which one third are either cross breeds or improved breeds. It is hoped that the scaling-up process will address climate change mitigation, through farmer decisions to keep a small number of small ruminants, thereby reducing greenhouse gas emissions.

Read more:

Nature article: Climate-adaptation effort cuts hunger in African villages http://go.nature.com/1BBtnwp
NPR article: Heat Tolerant, Tough Teeth, Lots Of Milk - They're Supergoats! http://n.pr/1RjM9xl
CCAFS blog: Nyando white goats: climate-resilient and a real-time fortune http://bit.ly/2C2Sv3H
CCAFS blog: Diversifying fodder for improved livestock productivity in Nyando http://bit.ly/2iSYkrX

Philip Kimeli, John Recha work at CCAFS East Africa. James Audho, Edwin Oyieng are Research Assistants in Livestock Breeding at ILRI.

8

Whole-farm greenhouse gas emission balances and hotspots quantified in smallholder coffee-dairy systems in Central Kenya

Understanding how agricultural management practices impact productivity, greenhouse gas emissions, and carbon sequestration throughout the farm is critical to developing climate-smart agriculture options.

By Julianna White

In Central Kenya, decreasing farm sizes have increased intensification in dairy farming, but it is unknown how the changing practices impact the whole-farm greenhouse gas (GHG) balance.

Researchers from the University of Copenhagen, the Centre de Coopération Internationale en Recherche pour le Développement (CIRAD), Institut de Recherche pour le Développement (IRD), and the World Agroforestry Centre (ICRAF), with support from mutliple institutions including CCAFS, analyzed data from 125 farming households in Murang'a County and published the results in 'Farm-scale greenhouse gas balances, hotspots and uncertainties in smallholder crop-livestock systems in Central Kenya' in *Agriculture Ecosystems and Environment*.

Using the *Cool Farm Tool*, they found farms to be a net source of greenhouse gas emissions. The following image, Figure 1 from the journal article, shows how typical farm-scale livelihood activities contribute to GHG emissions and carbon (C) sequestration in the integrated smallholder crop-livestock system found in Central Kenya. Numbers 1–5 represent typical farm components: (1) livestock, (2) manure management systems, (3) soil, (4) crops and (5) trees. Letters a–e are where carbon and nitrogen are released or absorbed: (a) fodder, crop residues and concentrates, (b) dung, urine and bedding materials, (c) inorganic fertiliser, manure and crop residues, (d) nitrogen uptake by crops, (e) the biomass

P.Karaimu (ILRI)

Scientists analyzed data from 125 farming households across Muranga County in Kenya to look at the impact of dairy farming on greenhouse gas emissions

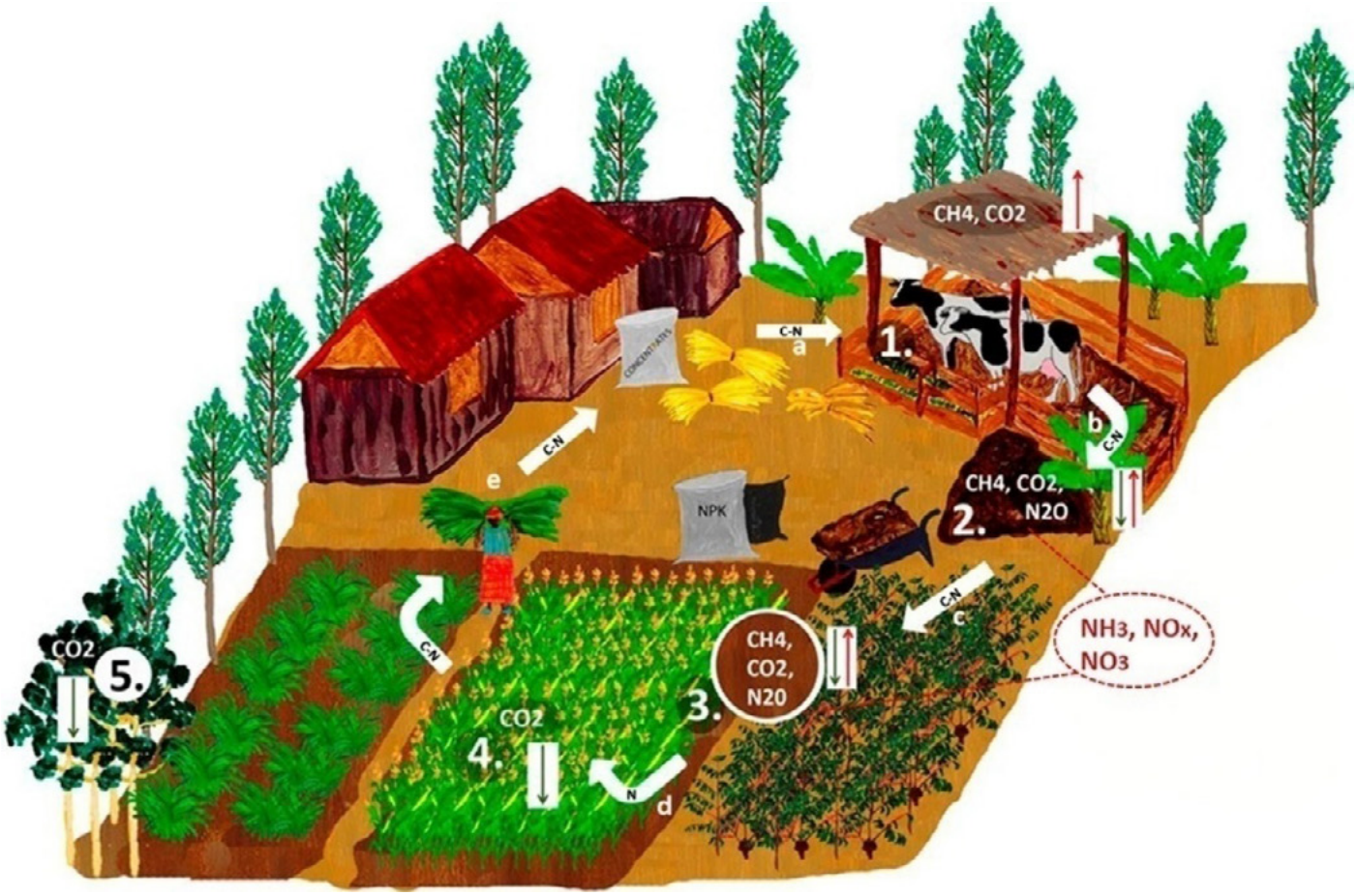


Image: Figure 1, Ortiz Gonzalo et al. 2017

Greenhouse gas emission sources and sinks in a typical integrated smallholder crop-livestock system found in Central Kenya.

harvested that can follow different pathways: livestock feed, compost heap or mulch.

Though emissions varied according to farm type, researchers found that livestock enteric fermentation followed by manure management systems and soil emissions are emission hotspots. In diversified farming systems found in the study area, farmers need to take holistic approaches to identify mitigation options since there are many interactions among farm activities and strategies that influence each other. The researchers point out use of crop residues as an example of complexity, noting that GHG trade-offs between crop residues use as soil amendment, fuel, composting or livestock feeding are still understudied.

Analyses provided evidence for two practices that can tip the balance toward low emissions development: manure management and agroforestry.

With some support from climate initiatives, researchers suggest, smallholder farmers in Central Kenya could mitigate climate change.

Read more:

Farm-scale greenhouse gas balances, hotspots and uncertainties in smallholder crop-livestock systems in Central Kenya. http://bit.ly/2l3fsjb
Greenhouse gases and climate-smart options in Central Kenya. http://bit.ly/2iVaGzG
Standard Assessment of Agricultural Mitigation Potentials and Livelihoods project: SAMPLES: http://bit.ly/2APkeVd

Julianna White is Program Manager for CCAFS Low Emissions Development research.

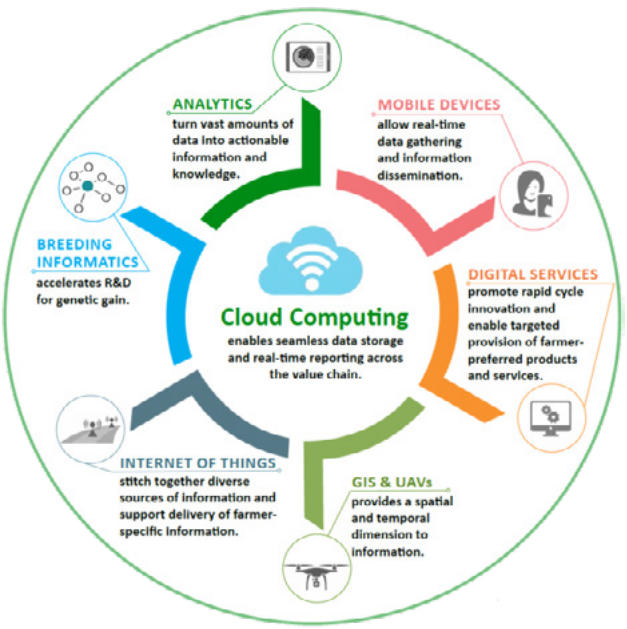
9

Is digital agriculture the key to revolutionize future farming in Africa?

Stakeholders discuss opportunities and challenges of digital agriculture in Africa.

By Emebet Tita and Dawit Solomon

Digital technology has significantly transformed all sectors of economic development. It has changed our way of living to the extent that it is difficult to imagine life without it. In developed countries, digital technologies and analytics are already transforming agriculture, making farm operations more insight-driven and efficient. However, agricultural productivity in developing countries, especially on the African continent, remains very low and the application of digital technologies still very limited.



Digital Agriculture: Pathway to Prosperity | ICRISAT

In October 2017, the CGIAR Research Program on Climate Change, Agriculture and Food Security in East Africa (CCAFS EA) in collaboration with the University of Copenhagen (UCPH), the International Maize and Wheat Improvement Centre (CIMMYT) Ethiopia, and Ethiopian Agricultural Research Center's (EIAR) Climate and Geospatial Research Program brought together stakeholders from the private sector, government organizations and universities in Addis Ababa, Ethiopia to explore digital agriculture and its potential to transform farming on the continent.

Stakeholders discussed the opportunities that digital agriculture presents and the existing challenges on the ground that need to be taken into consideration in order to successfully embrace and implement digital agriculture in Africa.

In his opening remarks, Dr. Dawit Solomon (CCAFS East Africa Regional Program Leader) highlighted that precision agriculture, internet-of-things, unmanned aerial vehicle (UAV) technology, crop and soil sensing, weed sensing, disease sensing, new breeding technologies, biologicals and biochips innovations that once seemed far-fetched but are now becoming an accessible and affordable reality, already in use in some corners of our world. So how can African countries adopt and deploy these technologies? Can Africa learn from the developed world? Or as Dr. Campbell, Director of CCAFS, puts it, "can Africa leapfrog into a new world in agriculture similar to mobile banking?"

Dr. Svend Christensen, Professor and Head of Department of Plant and Environmental Sciences at the University of Copenhagen in Denmark, emphasized that at the center of it

all is data, and how we obtain and use it.

However, most participants highlighted, gathering data, standardizing the collection process and data storage as major challenges. Data collection is scattered and stored in different data silos, in different formats, by different organizations. It is difficult to determine how such data can be integrated and used to make reliable comparisons. Thus, it is evident that collaboration between different stakeholders involved in agriculture is key to obtain and use data efficiently, as well as to reduce the cost of obtaining data.

Dr. Mandefro Nigussie, Senior Advisor with Digital Green, also added the starting point should be establishing a clear understanding of the existing framework of digital agriculture in the different countries, which include the policies, data infrastructure and the stakeholders in play. This can serve as a basis to identify the gaps and leveraging points, in order to commission initiatives that can drive targeted solutions.

Finally, participants also noted that while the potential for digital agriculture in Africa is real, any successful solution should involve the farmer in the design process, focus on the farmer's real world needs and devise a two-way flow of information to and from the farmer. It is also necessary that governments create and implement policies conducive to the changing needs of the digital age we live in.

On the following day, selected participants attended the Global Green Growth Week Public-Private Sector roundtable discussion on Transforming African Agriculture organized by CCAFS in collaboration with the Global Green Growth Institute (GGGI) and the Green Climate Fund (GCF). As a result of the discussions, CCAFS East Africa is now leading the formation of a Public Private Partnership project that is aimed at tackling the challenges related to agriculture data infrastructure. The project is expected to create a digital platform and application, expected to reach over 50,000 smallholder farmers, which will serve as a tool to gather data, communicate and receive intelligence specific to climate, agro-metrology, and market information.

Following the meeting, CCAFS, UCPH, CIMMYT and the EIAR organized site visits for selected participants to the wheat research site at Kulumsa Agricultural Research Centre (KARC) and the Eteya-Huruta wheat belt in Oromia region located over 175 km outside Addis Ababa, Ethiopia.

At KARC, participants observed the wheat nursery, test

D.Solomon (CCAFS)

Test fields from Eteya-Huruta wheat belt in Ethiopia's Oromia region.

fields and pilot farmers' fields. KARC is working on breeding high yield, stem and yellow rust resistant wheat varieties to be distributed to farmers. Farmers are also trained on farm management good practices and provided with mechanization tools for rent.

Driving back to Addis Ababa, away from the fields, much like the one pictured above, one cannot help but imagine that soon the farmer on the field will be using his mobile phone to switch on and off a harvester, a drone is flying over-head conducting soil and field analysis and a satellite somewhere in space is connected to both, storing and exchanging the data in a cloud database, and connecting the different users in the ecosystem.

Read more:

CCAFS Blog: Coordinating climate services with key institutions in Africa: http://bit.ly/2vDfiSg
CCAFS Blog: New program in Rwanda will transform agriculture through climate information and historic data reconstruction: http://bit.ly/2wQ43V4
PICSA Manual: Participatory Integrated Climate Services for Agriculture (PICSA) Manual: http://bit.ly/2wPJ8Sl

Emebet Tita is a private consultant located in Addis Ababa, Ethiopia.
Dawit Solomon is the Regional Program Leader at CCAFS East Africa.

10

Indigenous knowledge in weather forecasting: Lessons to build climate resilience in East Africa

Farmers and pastoralists across East Africa use a combination of meteorological, biological and astrological indicators to predict weather and to make important agricultural production decisions.

By Ayal Desalegn, Maren Radeny and Catherine Mungai

It is increasingly emerging that the provision of context-specific and user-friendly weather forecasting information determines the resilience of farmers and pastoralists to variability and climate change. In East Africa, provision of local specific, reliable, timely and user-friendly modern weather information services that effectively addresses the needs of farmers and pastoralists are limited. Farmers and pastoralists depend mainly on indigenous weather forecasting practices to inform their agricultural and pastoral practices and decisions.

Ayal Desalegn from Addis Ababa University recently presented case studies by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) of weather forecasting practices and lessons across East Africa—Ethiopia (Borana and Afar), Uganda (Hoima, Rakai and Bahima) and Tanzania (Lushoto)—at the United Nations Educational, Scientific and Cultural Organization (UNESCO) event titled 'Dialogue between indigenous and scientific knowledge on weather and climate: enhancing pastoralists' adaptation to climate change in Africa'. The event created an opportunity for indigenous and scientific experts to discuss how to integrate their knowledge on weather and climate. This is especially critical for pastoralists whose livelihoods are intrinsically determined by weather and climate conditions. The case studies presented by Ayal highlighted existing indigenous knowledge in weather forecasting practices, including the major sources of climate information for farmers and pastoralists across East Africa. A key finding from the case studies is that farmers and pastoralists trust and are responsive to indigenous weather forecasting sources.

Types and sources of climate information

Farmers and pastoralists across East Africa access different types of weather information. These include onset of rainfall, duration of the cropping season, expected rainfall amount and distribution, cessation of rainfall and severity of weather events (occurrence of strong winds and floods). Indigenous sources (indigenous knowledge experts, elders and their own observations), radio, exchanges with other people (relatives, friends, neighbors) and service providers (NGOs, researchers, extension workers) were the most common sources of weather information.

Different indicators for different communities

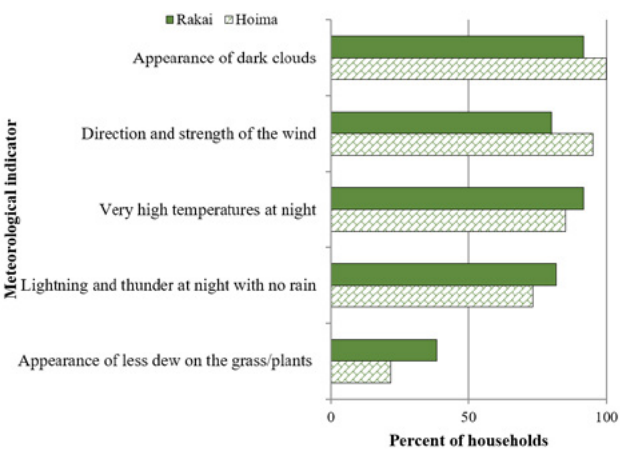
Farmers and pastoralists in East Africa have relied on the indigenous weather prediction methods for generations. According to the studies presented by Ayal, the great majority of farmers and pastoralists particularly in Ethiopia's Afar and Borana sites depend heavily on indigenous weather information compared to Tanzania and Uganda. Different

J. Recha (CCAFS)

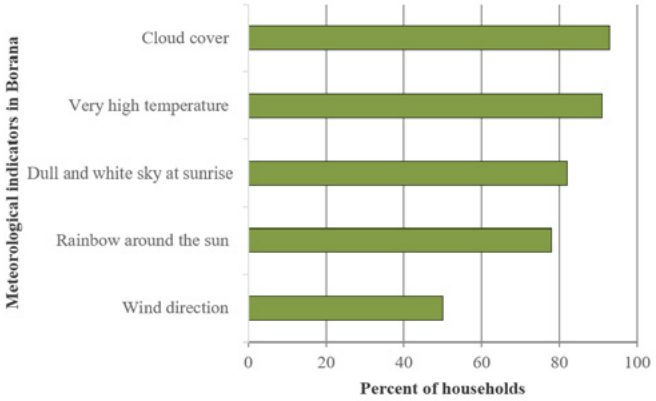
Farmers in Hoima, Uganda. Among the studied sites, different indigenous weather forecasting indicators have varying levels of acceptance. For instance, cloud color is the preferred meteorological indicator in Hoima.

weather forecasting indicators are used across the region.

Meteorological and astrological indigenous weather forecasting indicators include direction and strength of winds, star-moon alignment, apparent movement of stars, direction of the moon crescent, types of clouds, temperature conditions, lightning and thunder, color of the sky, and rainbow to forecast the next rainy season. In Uganda, indigenous knowledge forecasters associate the onset of rainfall with the appearance of clouds. The appearance of nimbostratus and cumulonimbus clouds indicates a high probability of rainfall. While in Ethiopia, the appearance of white feather like column (vertically standing) cloud in the sky is an indication that the rain is about come. A sky dominantly covered with light cloud indicates drought. Astrological indicators were more pronounced among pastoralists.

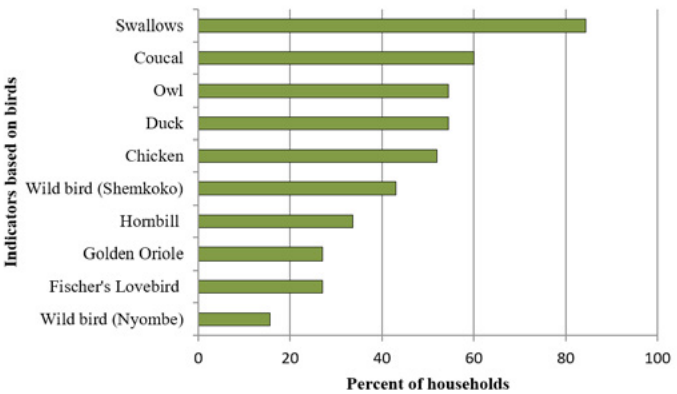


Meteorological indicators used to predict onset of rain in Hoima and Rakai, Uganda.



Meteorological indicators used to forecast timing and distribution of rainfall in Borana, Ethiopia.

Biological indicators focus on the behavior and activities of domestic and wild animals, insects and different species of plants for weather forecasting. For instance, in Uganda, the Mvule tree indicates onset of the rainy season. While in Ethiopia, the intestines of cattle, sheep and goats are used to forecast the magnitude, severity, and duration of drought, drought-affected places, disease outbreak, the prospect of peace, and/or conflict. In Tanzania, the occurrence of large flocks of swallows and swans, roaming from the South to the North during the months of September to November, is an indication of onset of short rains.



Biotic indicators based on birds in Lushoto, Tanzania.

Lessons learned

Different indigenous weather forecasting indicators have varying levels of acceptance depending on their precision. For instance, star-moon alignment is the most dependable weather information sources in Borana, while cloud color is the preferred indicator in Hoima and Rakai sites. The challenges facing indigenous knowledge weather forecasting include insufficient documentation of the knowledge and a poor knowledge transfer system, lack of coordinated research to investigate its accuracy and reliability, death of forecast experts, and influence of religion and modern education.

Indigenous knowledge plays a major role in local livelihoods and is crucial to supporting local efforts to forecast and make sense of seasonal climate situation at local level. However, progressive loss of indigenous knowledge threatens the ability of pastoralists and farmers to cope with and adapt to climate change. The challenge ahead is finding ways of integrating indigenous weather forecasting with the scientific weather forecasting systems.

Read more:

Blog: Integrating indigenous knowledge with scientific forecasts in Lushoto, Tanzania: http://bit.ly/2EtHEAp
Blog: Time for an exit strategy to traditional climate forecasting?: http://bit.ly/2ExLxbT
Working paper: Integrating Indigenous Knowledge with Scientific Seasonal Forecasts for Climate Risk Management in Lushoto District in Tanzania: http://bit.ly/2CqaQq8

Ayal Desalegn work at Addis Ababa University.
Maren Radeny is Science Officer and Catherine Mungai is Partnerships and Policy Specialist at CCAFS East Africa.

11

Success stories of climate-smart agriculture technologies and practices in East Africa

How are partnerships with farmers, development organizations and agricultural research organizations positively changing the lives of smallholder farmers in East Africa?

By Lili Szilagyi

Climate change and increased climate variability present new risks for smallholder farmers in East Africa who depend mainly on rainfed agriculture for their livelihoods.

To address this challenge, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has developed the Climate-Smart Village (CSV) Research for Development (R4D) approach. Using participatory methods, CCAFS and partners test technological and institutional options for dealing with climate change in agriculture, with the aim of scaling up and out the appropriate options and drawing out lessons for policymakers from local to global levels.

Climate-Smart Villages in East Africa

In East Africa, CCAFS facilitates six Climate-Smart Villages (CSVs): Lushoto (Tanzania), Wote and Nyando (Kenya), Hoima and Rakai (Uganda), and Borana (Ethiopia). Across the CSVs, smallholder farmers face various climate-related risks that include prolonged dry seasons and increased incidence of pests and diseases, which have become more frequent and intense, and have negative impacts on agricultural production.

A recently launched booklet by the CCAFS East Africa team presents some of the emerging stories of success of climate-smart agriculture technologies and practices that are positively changing the lives of smallholder farmers across East Africa. They were selected from a portfolio of climate-smart agriculture interventions and have potential for scaling up.

Improved crop varieties and resilient livestock breeds through collective action groups

To address climate-related risks and improve capacity to adapt to climate change, farmers across the CSVs are coming together through collective action groups. These groups are important platforms for innovative partnerships that provide new knowledge and skills, and build the capacity of local farmers to change farming practices while adopting new crop and livestock interventions. They empower members to pool financial resources for savings, provide labour for farm operations, and make it easier to provide agro-advisory services and farm inputs of good quality at affordable prices.

Farmers in the CSVs are implementing crop-smart and livestock-smart innovations, including:

- Better beans: to improve farmers' access to seeds of improved bean varieties and establish a sustainable seed

S.Kilungu (CCAFS)

V.Atakos (CCAFS)

T.Muchaba (CCAFS)

The stories in the booklet aim to contribute to promoting climate-smart agriculture, and help other smallholder farmers in similar vulnerable systems.

delivery system;
- Breeding resilient ruminants: to improve breeds of small ruminants, coupled with better livestock management practices for transforming their productivity, and supporting women's and young people's livelihoods;
- Championing better potatoes: to enable farmers to access potato varieties that can be grown all year round and increase potato yields; and
- Testing high-yielding root crops: to introduce resistant cassava and sweet potato varieties through participatory action research.

Sharing innovation

CCAFS and partners are coming up with innovative approaches to address climate variability and change, building on existing knowledge and institutional systems, for example:

- Scaling up smart farms: to help farmers to produce reliable harvests and increase yields;
- Conserving soil and water through agroforestry: to provide farming families with the 'five Fs' — food, fuel, fodder, finance and improved soil fertility;
- Sharing better climate information: to help farmers make sound farming decisions— what to plant, when to plant, when to harvest and so on; and
- Introducing intercrop innovations: to increase farm resilience and improve food security and incomes.

The stories described here can inform local, national and international climate change policies and strategies. They clearly demonstrate the increasing importance of collective action in addressing multiple challenges of climate change, and show how CCAFS and partners implement climate-smart technologies and practices to help farmers cope with climate change in East Africa.

Different CGIAR Centers are involved in research activities in the villages. These include the International Livestock Research Institute (ILRI), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Center for Tropical Agriculture (CIAT), the International Institute of Tropical Agriculture (IITA) and the International Potato Center (CIP).

Read more:

Stories of Success: Climate-Smart Villages in East Africa: http://bit.ly/2yhEQCJ
Climate-Smart Villages: An AR4D approach to scale up climate-smart agriculture: http://bit.ly/2BVNLMd

Lili Szilagyi is the Communications consultant for the CCAFS Program Management Unit and CCAFS East Africa.

12

How community seed banking strengthens adaptive capacity: Experiences from a farmers exchange visit

Farmer communities exchange knowledge and experience on open source seed systems and in-situ conservation through community seed banking.

By John Recha

On 24 July, a total of 170 farmers and researchers gathered in the Nyando Climate-Smart Villages (CSVs) in Kisumu County, Kenya. The gathering was an exchange visit where farmers from Hoima and Sheema districts in Uganda, and Nakuru and Vihiga Counties in Kenya visited Nyando CSVs to exchange knowledge on climate-smart agriculture with farmers from Kisumu and Kericho Counties of western Kenya. The trip was organized by partners in a 2016-2019 project titled "Promoting open source seed systems for beans, sorghum, finger millet and forages for climate change adaptation in Kenya, Tanzania, and Uganda", funded by the UN Food and Agriculture Organization's Benefit-Sharing Fund of the International Treaty on Plant Genetic Resources for Food and Agriculture - ITPGRFA.

The farmer exchange visit initiative in Nyando aimed at building the capacity of farmers to understand the importance of open source seed systems and in-situ conservation through community seed banking. It also aimed at sharing and exchanging genetic resources through community seed banking.

Farmer Joy Mugisha of Uganda's Kiziba community seed bank was a key resource person. She demonstrated to farmers the processes of establishing a community seed bank, maintaining diversity and managing the seed bank. She further informed Nyando farmers about the roles of a seed bank as follows:

- Conserving seeds of local crop varieties within the community;
- Facilitating capacity building of farmers and communities in production of high quality seeds;
- Multiplying seeds of local varieties that are rare and unique or which are becoming less available to farmers, and making them available every season;
- Useful in assessing diverse materials for different functional traits such as early maturity or drought tolerance;
- Providing diverse seeds of good quality that have potential to adapt to climate change and;
- Developing a local seed business to raise income for the sustainability of the gene bank.

Joy's Kiziba community seed bank in Uganda was established in 2010 in Sheema district of western Uganda. Currently, the community seed bank serves about 1,000 farmers in 10 villages. The community seed bank has begun collecting seeds from farmers in neighboring villages and regenerating planting material that can be stored in the community seed bank to provide diversity. To ensure a sustained supply of

P. Kimeli (CCAFS)

Farmer exchange visit in Nyando. Farmers share and exchange genetic seed resources through community seed banking for adapting to the changing climate.

seeds, farmers who borrow seeds from the community seed bank return double the amount after harvesting. Each farmer is trained in seed production and management to ensure that the seeds received in the community seed bank are of good quality.

The farmers from Uganda and Kenya came with a variety of seeds of cereals, legumes and vegetables. Each of the groups put their seeds on display and the diversity of seeds for each group was assessed by a panel of judges.

The visit was an important experience for farmers. As Hellen Were, a farmer from Kisumu County explains:

> "We had heard of seed banks from CCAFS staff before but we understood the concept only after this exchange visit. As soon as we were taught, we were very eager to start one in our community because the women in Nyando have been multiplying seed for years, but keeping the seed individually in our homes that could affect their viability," said Hellen.

These types of exchange visits often instill a sense of purpose and enthusiasm among farmers as they are able to see, first hand, the results of using CSA practices. The Nyando event ended with two major action points based on demand from Nyando farmers:

- Establishing a seed bank in Nyando that would serve the farmers in Kisumu and Kericho Counties. The participatory process will be guided by a manual developed by Bioversity International: Community Seed Banks Concept and Practice: Facilitator Handbook.
- More training on different aspects of climate change adaptation for women farmers.

Read more:

Community Seed Banks Concept and Practice: Facilitator Handbook. http://bit.ly/2nOwKRS

John Recha is a Post-Doctoral Fellow - Participatory Action Research at CCAFS East Africa.

13

Chicken to the rescue: How farmers in Nyando are managing climate risks

How do village chicken improve farmers' food security?

By John Recha and Philip Kimeli

Long experiences of uncertainty about weather patterns has spurred smallholder farmers into looking for ways to address climate change related risks. As the rainy seasons are characterized by late onset, early cessation, uneven geographical distribution, and prolonged and frequent dry spells, keeping higher flocks of village chicken by women farmers is becoming more common in the rural areas.

In the Nyando Climate-Smart Villages (CSVs), most agricultural activities are undertaken by women farmers. The existing community based organizations (CBOs) that are made up of several farmer groups are expanding collective action for agricultural innovations through loaning from Community Innovation Funds. The farmers borrow funds for investing in village chicken farming, which has been prioritized and embraced by women. The CBOs manage the credit system at village level by accepting payment-in-kind as a means of loan repayment.

Indigenous village chicken under free range system

All the households keep a number of indigenous village chickens under traditional free range semi-scavenging systems. The average number of birds are 30 per household. The chickens are generally owned by women and children to generate cash revenue and supply eggs and meat to their personal family's diet. In addition, village chickens help to provide high quality fertilizer, and act as a form of household savings and insurance.

Indigenous village chickens are preferred because they can thrive despite irregular supply of feed and water and with minimum healthcare. One of the most important positive characteristics of these village chicken is their hardiness, which is ability to tolerate the harsh environmental condition and unimproved husbandry practices (handling, watering, and feeding) without much loss in production. These chicken are part of balanced crop-livestock farming systems. They have vital roles in the Nyando households as a source of high quality animal protein and emergency cash and play a significant role in the sociocultural life of the community. Although indigenous village chickens are slow growers and layers of small sized eggs, the hens are ideal mothers and good sitters, excellent foragers, and possess natural immunity against common diseases. Chicken generally scavenge around the homestead during day time, where they eat kitchen waste, left over cereal like sorghum, legumes, green grass, insects, and other available feed stuff.

Crossbred chicken under improved management

About 40% of Nyando farmers also keep improved chicken breeds, in addition to the indigenous flock. The popular cross breeds are *Kuroiler, Kenbrew and Rainbow*. Farmers get improved chicks from commercial hatcheries, and raise them in improved chicken housing designed to accommodate at least 50 birds. The reasons that make women farmers go for the improved breeds is because they mature faster, have tender meat, and also produce more eggs compared to the indigenous ones.

The potential for egg production and growth is very low under smallholder farmer's scavenging systems. Whereas the indigenous breeds take 12 months from hatching to attain 2 kg live weight, the improved breeds take 4 months to attain

T.Muchaba(CCAFS)

Village chicken provide high quality fertilizer, and act as a form of household savings and insurance.

that weight and can be sold for meat. In case the farmers want the improved chicken to lay eggs, they retain the hens for a longer time. These hens start laying eggs from the age of six months for a period of one year before the egg production ability reduces; when they are sold off. Within the egg-laying period of 12 months, the improved hens give an average of 320 eggs which translates to 26 eggs per month, that is about three times higher than eggs produced by indigenous chicken in the same period.

In order to improve levels of production, the farmers undergo training on the following:

- Construction and maintenance of improved chicken housing;
- Elaborate feeding program that involves formulation of feed from locally available foods;
- Disease control and treatment and;
- Record keeping.

Farmer Risper Ogogo of Onyuongo village of Kisumu County is an elderly widow with six children and owns 0.6 hectares of land. She has dedicated her time and energy into chicken production. She sells eggs and chicken for meat, enabling her to purchase other kinds of food for her family.

"I have invested my energy and resources into improved chicken farming for five years now. Before 2012, I could only manage to have a flock of 15 indigenous chicken that was mainly meant for slaughter for my visitors – a habit that most of our people adhere to. Currently, I rear improved birds and my flock size varies from time to time ranging between 75 and 150 birds. I ensure proper chick management, good feeding regime, and disease control and management through routine vaccinations and improved hygiene. Each year, I earn Kenya Shillings 120,000 (USD 1,200) from poultry only," Risper asserts.

Risper strives to maintain and improve her chicken production by seeking for more knowledge from all sources within her reach. She participates in farmer training workshops, seeks for advice from livestock extension agents working in the community, and even her fellow champion farmers with the same enterprise. To scale up this innovation, knowledge is shared through farmer learning events, farmer exchange visits, and training through agricultural fairs and exhibitions.

John Recha and Philip Kimeli work for CCAFS East Africa.

14

Could this be the game changer in climate information services innovation?

What would you do if someone returned your lost wallet with a $100 note in it?

By Tabitha Muchaba

This is the feeling farmers from Cyanika centre, Eastern province, Rwanda had after participating in the Participatory Integrated Climate Services for Agriculture (PICSA) field training process. The excitement and motivation to go back to the farm to apply what they had learnt from the training could not be hidden from their faces.

"I always wait for rain in order to start planting, but now, I know how to make projections and prepare my farm," Niweshuti Aline, farmer

The field training was part of a four-day training of trainers on PICSA that took place in Huye district in the southern province of Rwanda from 12 – 16 June 2017. The training allowed participants to work hands-on with a group of 40 men and women smallholder farmers to test both skills and knowledge gained during the training and to build their confidence in the PICSA process. This exercise, conducted in Kinyarwanda (the national language), served as both intermediary training and as a trial for the PICSA approach. The participants had an opportunity to assess first-hand the effectiveness of PICSA and identify areas that need improvement.

The farmers shared the traditional indicators that they use to anticipate weather and climate conditions such as birds, frogs, and invertebrates such as termites. They were also trained on how to develop a time series bar graph of recorded seasonal rainfall totals and validate it against their collective memory.

The field activity provided a great opportunity for CCAFS to interview some of the farmers on their challenges and expectations from the PICSA process. The testimonies are summarized below.

Name: Kubwimana Generoze

As a single mother, I have to work hard to provide for my children. I grow and sell beans, maize, Irish and sweet potatoes and depend a lot on rain. Recently, the planting season has changed, I used to start preparing my farm in September but this has changed to October or sometimes late November and December. While I receive weather

information from the radio, I feel that it is not reliable. The training was very informative as I have learned more about climate change and its impacts on the farming process, how and when to plant and the type of crops to plant. I also like meeting new people and discovering new things that I did not know.

My parting words to the trainers, "I would love to receive monthly information on weather."

Name: Niweshuti Aline

I am a single mother with two children. I provide for my family by working on other people's farms. I also have a kitchen garden and I plant soya beans, beans, sweet potatoes, and maize. As a young female farmer, it's hard for me to own land. I farm on rented land and the money is never enough to cater for my family.

In addition to this, the weather has really changed. The rain intensity has increased in the past years destroying crops and causing a lot of erosion. I have never received any weather information, thus this training has been very beneficial to me. I now know how to carry out a climate forecast, develop a seasonal calendar, project the onset of rain and measure rainfall. I would like to participate in more training like this and receive daily information on the weather forecast.

Name: Munyeshema Tharcise

I am married and have two children. Every morning I wake up to go to the farm while my wife is left at home to take care of the children. I grow beans, maize, cassava and potatoes and I also keep a goat for manure.

G.Nsengiyumva (CCAFS)

Through PICSA, farmers are using climate information services to make decisions. The PICSA training aims to reach up to a million of Rwanda's smallholder farmers.

In my opinion, the climate has really changed. It's getting hotter and hotter and farm production has reduced. I have been receiving weather information from the radio which has helped me prepare my farm before onset of rain. The government has also been very supportive as they have subsidized the cost of fertilizers and seeds at the start of every season.

I buy seeds at 500 RFR while others buy at 600 RFR.

The training has been very helpful to me. I have gained additional information on the onset and cessation of seasonal rainfall, planning and budgeting for the farming activities and how to keep records. In the future, I would like the training to be continuous and consistence.

Name: Nzamuramba Emmanuel

I love farming as it provides food for my family. I grow beans, potatoes, sorghum and soya beans and keep a cow that produces 5-8 litres of milk a day. I also work as a mason during the week.

The climate has really changed in the last 5 years. We used to start planting in September, but this has changed to October. Farm production has reduced, I have to work extra hours to put food on the table.

The Twigire Muhinzi (farmers' promoters) and local agronomists have been very beneficial to us. I always receive weather information from them including information on when to plant. Through this training I have learnt more about planning and seasonal forecasts. With this knowledge, I can identify the best crop option under different weather conditions.

From the PICSA Trainees

We also interviewed some of the trainees on the PICSA process:

Donatha Mukamuganga - Nyamagabe District agronomist

The PICSA process is very important for the farmers. The training manuals are detailed and informative and the farmers are now familiar with the weather changes, when and what type of crop to plant, the quantity of rain and when to do irrigation. I feel that some of the training concepts and processes are hard to explain to farmers i.e. some of the graphs are too complex to interpret. I would like to learn how to explain the graphs in a simplified way.

Other challenges I foresee include farmers' illiteracy and blindness.

Amos Uwezeye - Data Quality Control Officer, Meteo Rwanda

The PICSA process is good as it provides farmers with climate information to reduce agricultural loss. The farmers have learnt how to prepare action plans and budget, which will improve their way of life and investment. Climate and weather information on its own is not useful but when combined with agro advisories it is more useful for farmers.

The PICSA process is part of the USAID-funded Rwanda Climate Services for Agriculture project. The 4 year project was launched in 2016 and we look forward to interviewing these farmers and trainees again to share lessons learnt and hopefully, success stories on how localizing climate information services has helped them improve their livelihoods.

For more information regarding the project contact Desire Kagabo, the CCAFS Rwanda Climate Services for Agriculture Project Coordinator based at the International Center for Tropical Agriculture (CIAT), Kigali, Rwanda d.kagabo@cgiar.org

Read more:

Blog: PICSA training of trainers: strengthening national and local capacity for climate services for agriculture in Rwanda: http://bit.ly/2iS8mcS
Project factsheet: Rwanda Climate Services for Agriculture: http://bit.ly/2msT1PC
Blog: Establishing the foundation for climate services in Rwanda: http://bit.ly/2C5wxwV
PICSA Manual: Participatory Integrated Climate Services for Agriculture (PICSA) Manual: http://bit.ly/2C5wxwV

Photos taken by T.Muchaba (CCAFS).
Tabitha Muchaba works for CCAFS East Africa.

15

Intercropping mango trees benefits farmers in the Albertine Rift

Farmers in Uganda learn about agronomic practices, enabling them to increase productivity and income.

By John Recha

Since the year 2012, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has collaborated with Uganda's National Agricultural Research Organisation (NARO) to help farmers in Hoima respond to climate change and variability in order to reduce periodic hunger, and improve food security and household income. This is achieved through the integration of a science approach based on the CCAFS Climate-Smart Village (CSV) model, focusing on improving local knowledge of climate risks to inform farming decisions.

Starting in 2013, two community-based organizations– Bagonza-Kukora and Kyabigambire Farmers Organisation– were formed in Hoima to empower communities through collective action. NARO's local research centre called Bulindi Zonal Agricultural Research and Development Institute (Bulindi ZARDI) implements a participatory process with the farmers to identify interventions that respond to climate-related risks. After prioritizing the interventions, Bulindi ZARDI builds the capacity of farmers through training and extension support for improved agroforestry, soil and water management, improved crop production and improved livestock production.

For the last five years, the farmers have been intercropping improved mango fruit trees with food crops such as maize, sorghum, cassava, sweet potatoes, nitrogen fixing legumes (beans and groundnuts) and indigenous vegetables. Mangoes are among the five popular fresh fruits in Uganda, and the trees are planted across contours and also on terrace ridges to conserve soil by reducing erosion.

In 2017, over 50 farmers in Hoima got a threefold mango yield from improved mango trees. The local mango varieties yield about 200 fruits per year, but the improved varieties gave an average of 600 fruits. Champion farmer Asiimwe Zainabo explained how the improved mango varieties impacted his harvest:

> "The improved mango varieties that I planted in 2013 matured within three years and gave me the first harvest. This is half the time it takes the local varieties on my farm to produce the first fruits. In addition, the bumper harvest from the improved varieties pleasantly surprised me. From my 50 mango trees, I was able to harvest about six tons of fresh fruits that were also bigger, more delicious, and had less fibre compared to the local mango varieties. Those fruits sold fast."

The improved mango varieties that are planted in Hoima are *Boribo, Bire* and *Tommy Artkins*. Farmers are trained on the following agronomic practices:

- Soils and spacing: Mangoes are planted in deep soils with good drainage. The optimum spacing of 8m by 8m gives 144 plants per hectare.
- Planting: Farmers are advised to plant during the rainy season, in holes which are 0.6m wide and 0.6 m deep.
- Weeding: Regular removal of weeds around the trees and intercrops is needed. At the young stage of the crop, intercropping with lowly growing crops like beans, and groundnuts is encouraged.
- Fertilizer requirement: Applying manure at least once a year provides nutrients for faster growth hence building

J. Recha (CCAFS)

A farmer evaluating one of the grafted Mango seedlings in Hoima, Uganda. Growing mangoes as part of agroforestry offers both climate change mitigation and adaptation benefits to farmers in Hoima.

productive capacity, and helps to fend off some diseases.

- Mulching: Farmers are advised to mulch the plants immediately after transplanting to conserve soil moisture, improve fertility and health of the soil, and reduce weed growth.
- Watering: Young trees should be watered at least once a week during dry periods. It is advisable to give water during flowering to avoid flower abortion. Similarly, watering after the fruit sets reduces fruit abortion and increases fruit size.
- Pruning: This is done at a young stage, when the trees are at a height of 0.5m-1m above the ground. Pruning the excessive shaded branches removes leaves that do not photosynthesize.
- Harvesting: Mature fruits with smooth undamaged skin should be picked.
- Production: Time from flowering to maturity is 100-150 days depending on variety. Under good management, 600 fruits per year can be produced. The yield range is 8-16 ton/ha can be obtained, depending on management, variety, and age of orchard. Improved varieties can weigh from 0.3kg each.
- Pests and diseases: Integrated pest management is emphasized, and biological and chemical methods for disease management taught to farmers.

The mangoes were collected from individual farmers by transporting agents who delivered them to big local markets in Hoima district headquarters and later to Kampala city. Some of the mangoes end up with processing companies; processing is still low and is mainly limited to extraction of juice, drying, bottling and labeling. As a source of vitamins, mangoes have contributed to the health of communities in Hoima. Part of the income from mangoes is channeled into village savings through table banking and loaning. Farmers invest their income from the mangoes in other agricultural activities such as horticulture, purchasing food, paying school fees, and off-farm activities such as small businesses.

Growing mangoes as part of agroforestry offers both climate change mitigation and adaptation benefits to Hoima farmers. This is because a high amount of biomass carbon is sequestered by mango trees on farms. Increasing biomass carbon on agricultural lands through agroforestry may also improve biodiversity, water quality, and, in some cases, hydrological cycles. Trees regulate moisture – moderating drought or heavy precipitation – and soil temperature. Mango trees are a critical component of climate-smart agriculture.

Read more:

Stories of Success: Climate-Smart Villages in East Africa: http://bit.ly/2BzEhcR
Progress in achieving household food security in climate-smart villages in the Albertine Rift, western Uganda: http://bit.ly/2HiFNAh

John Recha is a Post Doctoral Fellow with CCAFS East Africa.

16

Lessons for successful scaling of climate-smart agriculture innovations

Two concluding projects offer lessons for successful implementation of climate-smart agriculture innovations at wider scales.

By John Francis Okiror and Laura Cramer

Evidence generated from two aligned climate-smart agriculture (CSA) scaling projects was recently presented to attendees at project wrap-up meetings in Tanzania and Uganda. The attendees included parliamentarians, development partners, government technical experts, scientists, representatives from non-governmental institutions, and farmer representatives. The evidence was given through testimonies, PowerPoint presentations, panel and plenary discussions, as well as short documentaries. The workshops were organized on 27 October (Tanzania) and 30 October (Uganda) by the International Institute of Tropical Agriculture (IITA), International Center for Tropical Agriculture (CIAT), and partners to share lessons and inform future climate adaptation, CSA planning, implementation and scaling.

The four-year projects, which both started in 2014 and will conclude at the end of 2017, were implemented under the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). In Uganda, the projects were carried out with the Climate Change Department under the Ministry of Water and Environment (MWE) and in Tanzania by the Environment Management Unit (EMU) under the Ministry of Agriculture, Livestock and Fisheries (MALF).

Project 1: Policy action for climate change adaptation (PACCA)

The IITA-led PACCA project was funded by CCAFS and aimed to use interdisciplinary science-based recommendations to influence and link policies and institutions from national to local level for the development and adoption of climate resilient food systems in East Africa. Policy and policy actor analysis was used in the beginning to map the status of the adaptation policies and the coordination of policy actors so as to identify entry-points for improvement.

The project also conducted research on organizational networks to understand drivers of climate smart technology (CST) uptake to guide choices for CST development and adoption. Trade-off analyses of locally appropriate CSA practices across scales were used to inform investment decisions. The project also created evidence-based gender awareness among policy actors, with the intent to influence gender responsive implementation of climate change adaptation policies. By remaining engaged with policymakers throughout the research process, the researchers were able to work together toward implementation of jointly proposed policy engagement strategies.

Using the concept of a "learning alliance", the project aims to enhance members' capacity to develop and implement more climate-resilient and gender-sensitive policies by creating a space for knowledge-sharing, training on adaptation planning tools, and distributing the latest climate smart agriculture research. Speaking on behalf of the Commissioner for the Climate Change Department at the Uganda event, Mr. Bob Natifu highlighted the contribution of the national climate change learning alliance in improving the understanding of climate change impacts, thus enabling public institutions, individuals and non-state actors to tap into the opportunities

Kelvin Shikuku and Caroline Mwongera

In one of the project activities, farmers in Mbarali – Rujewa rank the different indicators that they use to prioritize climate smart agriculture practices.

and co-benefits arising from mitigation and adaptation actions.

The learning alliance model is being adapted by the climate change department, which is the climate change focal point in the country, to implement the capacity building component of the UNFCCC.

Project 2: Food security and farming system resilience

The CIAT-led project on 'Increasing food security and farming system resilience in East Africa through wide-scale adoption of climate smart agriculture practices' was funded by the International Fund for Agriculture Development (IFAD) and aimed to improve food security and farming systems resilience of smallholder mixed crop-livestock farmers in East Africa while mitigating climate change. The project, whose strength was in combining participatory and systematic approaches, according to the Coordinator Caroline Mwongera, built on the effectiveness of CSA by generating a scientific basis for strategic targeting of locally appropriate practices.

A desktop assessment of CSA practices was done to clarify their potential impacts on food production, resilience of farming systems and greenhouse gas balance. Additionally, spatially explicit monitoring and modelling of land health and organic suitability as well as multi-dimensional trade-off analysis was conducted to identify locally appropriate CSA technologies. Biophysical field surveys and gender disaggregated socio-economic surveys were done to assess socio-economic processes in landscapes to better understand opportunities for CSA scaling. Assessment of land and soil health was carried out using the Land Degradation Surveillance Framework (LDSF) to quantify soil organic carbon content, crop diversity, management practices, and measure land degradation and effectiveness of rehabilitation measures over time.

The most promising CSA practices were implemented and appraised at local level to identify perceived benefits and barriers of adoption. Using demonstration plots managed by farmers and demonstration trainings with local partners such as ZOA (an international relief and recovery organization) in Northern Uganda, and the African Conservation Tillage

Network (ACTN) in Tanzania, as well as smart monitoring combining ICT tools with the "5Q" approach, knowledge on CSA was increased among smallholder farming communities which led to greater adoption of locally appropriate CSA technologies for improved food security. Through strategic policy and development partnerships, CSA activities were up-scaled and out-scaled in East Africa. The learning alliance approach, promoted by the PACCA project, was used for sharing knowledge, tools, approaches and policies for wide-scale adoption of CSA technologies.

Project impacts

The projects were able to make significant contributions to the ways in which both countries are addressing agricultural adaptation to climate change. By working directly with decision makers, the researchers were able to share knowledge, change attitudes, and enhance people's capacities.

Mr. Natifu noted that "the CSA scaling projects have enabled the piloting of the Uganda CSA program, jointly implemented by Ministry of Agriculture, Animal Industry and Fisheries and Ministry of Water and Environment."

"It is only through these learning alliances that we can upscale practices," Ms. Natai Shakwaanande, the Head of Environment Management Unit Ministry of Agriculture, Livestock and Fisheries (MALF), said during the wrap up event in Tanzania. "We are trying to see how to merge the Tanzania CSA Taskforce with the learning alliance to create the Tanzania CSA Alliance."

Some local-level learning alliances have successfully attracted climate change funding from the district budgets. "We convinced the councilors to pass a budget of TZS 10 million for climate change issues and for the Chairperson to participate in learning alliance meetings," said Moses Eliezer, the Lushoto learning alliance facilitator. "We disseminated climate change information to the grassroots level, selecting four people as ambassadors in village assemblies and documented success stories in pilot villages."

The learning alliances have bridged coordination gaps across sectors and between central and local governments, making policy formulation more "bottom up" by involving district level policy implementers and local community in national policy formulation. They provide coordinated climate change engagement and improve skills for adaptation planning, which promotes the creation of climate change policies that are resilient and gender-responsive.

Gathering lessons to share with future projects

Smallholder farming systems in East Africa are a complex matrix of land cover typologies, socio-economic realities, and governance structures. The projects that are winding down offer the following lessons to better target adaptive and resilient farming systems and are important for successful scaling of CSA innovations.

1. Formulate equitable climate-smart agriculture policies;
2. Design climate smart agricultural interventions to be gender inclusive;
3. Assess whole-farm trade-offs and synergies;
4. Support farmer-to-farmer and community wide social learning;
5. Know what drives the adoption of climate smart agriculture across different scales;
6. Target pathways to scale out climate smart agriculture technologies to farming communities;
7. Prioritize among climate-smart agriculture options and benefits for greater impacts;
8. Invest in climate smart soil and land health; and
9. Monitor climate smart agriculture interventions with a real time participatory tool.

These lessons have the potential for global application and have been used to scale out successful practices to a wider set of stakeholders. In Uganda, they informed the design of the Project for the Restoration of Livelihoods in the Northern Region (PRELNOR), a US$70 million project funded by the Government of Uganda and IFAD. The aim is to share the lessons more broadly and help inform successful CSA targeting and scaling to enhance climate resilience.

Read more:

Briefs: 9 lessons for spreading successful climate-smart agricultural innovations: http://bit.ly/2EFquQp

John Francis Okiror is a Communications Specialist at IITA, and Laura Cramer is Science Officer for the Flagship on Priorities and Policies for Climate Smart Agriculture.

Out & About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1. Farmer exchange visit in Nyando CSVs, western Kenya. 2. CCAFS scientists on a field visit in Ethiopia. 3. Catherine Mungai speaking at the AgriProFocus Kenya Network Day 2017. 4. Establishment of the Rwanda National Framework for Climate Services (NFCS). 5. Participants at The Technical Exchange on ICPAC and National Climate Maproom event in Zanzibar, Tanzania.

In our diary

February
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Advancing the Koronivia joint work on agriculture under the UNFCCC
Webinar

March
8
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International Women's Day

March
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2018

Impactful and measurable progress on climate-smart agriculture in corporate value chains
Venue: University of Vermont, Burlington VT

CCAFS EA in the media

Africa: When Climate Policy Fails on the Ground (AllAfrica) http://bit.ly/2EJZzHs
Can 365 Years of Climate History Help Prevent Crises in East Africa? (IISD) http://bit.ly/2wFNBFK
Women have a key role in mitigating climate change (DW) http://bit.ly/2t5hMcU

Further Reading

CCAFS Latest Publications

Brief: Prioritize among climate-smart agricultural options and benefits for greater impact: http://bit.ly/2Gz3WBk

Info note: Climate Services for Agriculture in Rwanda: Initial findings from PICSA monitoring and evaluation: http://bit.ly/2EIOwu3

Working paper: Gender review of climate change legislative and policy frameworks and strategies in East Africa: http://bit.ly/2Ca91lx

Journal article: Policy support for sustainable crop intensification in Eastern Africa: http://bit.ly/2GxjSEk

CCAFS Latest Publications Booklet: Stories of Success: Climate-Smart Villages in East Africa: http://bit.ly/2Bdzmfh

Info Note: Climate services for agriculture in Rwanda: What farmers know about climate information services in Rwanda: http://bit.ly/2j2Ykpo

Journal article: Adoption and Dissemination Pathways for Climate Smart Agriculture Technologies and Practices for Climate-Resilient Livelihoods in Lushoto, Northeast Tanzania: http://bit.ly/2jXYsHK

Journal article: Smallholder farmers in eastern Africa and climate change: a review of risks and adaptation options with implications for future adaptation programmes: http://bit.ly/2Awe1fP

Workshop report: Participatory Integrated Climate Services for Agriculture (PICSA) Intermediary Training in Muhanga, Rwanda: http://bit.ly/2CfmZ1r

Workshop report: Participatory Integrated Climate Services for Agriculture (PICSA) Specialist Intermediary Training in Nyamata, http://bit.ly/2j66vBd

CCAFS Tools

CCAFS website and blog updated daily with news on policy and practice, research, events and downloadable publications from the CGIAR and partners.

Website: http://bit.ly/1gX2uKi Blog: http://bit.ly/Blogs_EastAfrica

Adaptation and Mitigation Knowledge Network (AMKN) is a map-based platform for sharing data and knowledge on agricultural adaptation and mitigation. http://bit.ly/AMKN_Maps

AgTrials Large public repository of agricultural trial data sets, with different crops, technologies and climates. http://bit.ly/AgTrials

Food Security CASE maps Map-based projections of crop area and yields, average calorie availability, and international trade flows across the world. http://bit.ly/Casemaps

MarkSim II Generator of future location-specific rainfall series, based on a choice of General Circulation Models: http://bit.ly/MarkSimGCM

GCM data portal Set of downscaled climate data sets. http://bit.ly/Climate_Data

Dataverse Public portal for full CCAFS data sets such as the baseline surveys from CCAFS East Africa sites that include information on farmers' current adaptive practices. http://bit.ly/Baseline-Surveys

Big Facts website Get all the links on climate change, agriculture and food security: http://bit.ly/1gYWjWt

Atlas of CCAFS sites Browse colourful maps of CCAFS research sites in three regions: East Africa, West Africa and South Asia: http://bit.ly/1iSfwHd

Core Sites in the CCAFS regions This portfolio includes brief descriptions of CCAFS core sites in East Africa, West Africa and South Asia, including coordinates of the sampling frames of the baseline surveys: http://bit.ly/1dKwrfG

Adaptation and Mitigation Knowledge Network is a map-based platform for sharing dataand knowledge on agricultural adaptation and mitigation: http://bit.ly/1kiEnng

Climate Analogues This is a tool that uses spatial and temporal variability in climate projections to identify and map sites with statistically similar climates across space and time: http://bit.ly/1pzmVhl

Climate and Agriculture Network for Africa: This web-based platform seeks to link scientists with policy makers to address climate change, agriculture and food security issues in Africa. http://bit.ly/1BHmhG0

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